

Implementing 3D printers to produce airworthy aircraft cabin parts



Air travel is something many of us take for granted. We don't stop to think about the millions of people traveling up in the sky at any moment. To continue to do this safely, these aircrafts often have to pass the garage to get maintained. The role of these garages are to keep aircrafts technically fit to fly, the condition it remains airworthy.

KLM Royal Dutch Airlines is the flag carrier airline of the Netherlands. The KLM Group consists of KLM and several daughter companies. They fly passengers and cargo from a to b and hereafter maintain their aircrafts. This last business domain is the called KLM Engineering & Maintenance and is unknown by the general audience. Important to know is that not many airlines in the world operate in the

mentioned 3 businesses. The aerospace industry is constantly striving and demanding for lighter, better and cheaper aircraft components without compromising on safety and reliability requirements. The never ending thirst is keeping the search alive to continue optimizing strength-to-weight ratio to improve fuel efficiency and reduce emissions. (Braga D., et al., 2014). This thirst ensures aerospace designers to strive in minimizing the amount of material used in every component, which results in increased design complexity with respect to the structure, function, and property. (Gibson I., et al., 2014).

The next step for KLM is, manufacturing own certified and airworthy aircraft parts with 3D printers. But how and which?

Product function: Economy class seat armrest
3D Print tech.: Selective Laser Sintering (SLS)
Material 3D print: PA2241FR

Original part
186,90 EUR
83 days lead time
0,186 kg

3D printed part
116,94 EUR
2 days lead time
0,077 kg



The replacement of all original armrests on the 777 and 787 fleet with this printed will results in only \$4.665.000 on fuel cost reduction annually, thanks to reduced weight.

Fehmihan Kamber
3D print graduate @ KLM

The chance of success is very high for this redesigned armrest to be certified.

Rik Steenkist
manager cabin engineering @ KLM

Only the metal construction in the armrest is covered by the hard certification and is this redesign part just a cover. Delta currently executes these types of modifications on seats.

Geoff Pettis
manager cabin engineering @ Delta

Products printed with SLS are watertight. It can be made water repellent for color dying and shot peening the part. The obtained smoother surface will reduce the part getting dirty from sweat and skin flakes.

Eric van Es
sales engineer @ Parts on Demand

The material PA2241FR is certified for the use in the aircraft cabin and is resistant to KLM cleaning chemicals. Color dying the part would protect it from salty water and UV.

Daniel Hoogstraate
account manager for the Netherlands @ Materialise



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